

DISCUSSION OF THE AMENDMENT

A typographical error has been corrected in the specification.

No new matter is believed to have been added by the above amendment. Claims 1-8 remain active in the application; Claims 9-14 stand withdrawn from consideration.

REMARKS

The rejections of Claims 1-8 under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over, U.S. 2004/0157078 A1 (Yoshida), are respectfully traversed.

The present invention relates to a polyvinyl acetal. More precisely, the invention relates to a polyvinyl acetal obtained through acetalization of a polyvinyl alcohol (PVA) terminated with an ionic group via a sulfido bond, and to its use.

More specifically, as recited in Claim 1, the invention is a polyvinyl acetal having a degree of acetalization of from 45 to 80 mol%, which is obtained through acetalization of a polyvinyl alcohol that has a degree of polymerization of from 30 to 1000 and a degree of hydrolysis of from 80.0 to 99.99 mol% and is terminated with an ionic group via a sulfido bond while satisfying the requirement of the following formula (1):

$$0.15 \leq \text{content} \leq 218.3 \times P^{-1.046} \quad (1)$$

wherein the content means the content of the ionic group bonded to the polyvinyl alcohol via a sulfido bond (mol%); and P indicates the degree of polymerization of the polyvinyl alcohol.

Yoshida discloses polyvinyl acetals containing functional groups, preferably ionic groups, and more preferably acidic groups such as carboxyl and sulfonic groups [0033]. However, Yoshida does not disclose a content of ionic group as a percentage of the PVA from which his polyvinyl acetals are prepared. Nor can this information be gleaned from Yoshida's examples, which begin with a PVA that has already been modified by, for example, a carboxylic acid, with no disclosure of the content of the carboxylic group. Thus, there is no evidence in Yoshida to support the Examiner's finding that Yoshida inherently meets the terms of the present claims.

Nor does Yoshida otherwise render the present claims unpatentable. Applicants describe in the specification what happens when formula (1) of Claim 1 is not satisfied, in the

paragraph bridging pages 9 and 10. Thus, when the ionic group content is less than 0.15 mol%, and the polyvinyl acetal is used as a binder for ceramic forming, ceramic green sheets formed could not be homogeneous, and when the polyvinyl acetal is used as a binder for ink or paint, ink or paint having a low solution viscosity and a high solid content (high pigment content) will be difficult to produce. On the other hand, when the content is above $218.3 \times P^{-1.046}$, as recited in formula (1), and when the polyvinyl acetal is used as a binder for ceramic forming, then the ceramic green sheets formed could not be homogeneous and the mechanical strength of the sheets may be low. When the polyvinyl acetal is used as a binder for ink or paint, it will be ineffective for lowering the solution viscosity of the ink or paint produced and for increasing the pigment content thereof.

The importance of satisfying above-discussed formula (1) of Claim 1 is demonstrated in the specification herein. Indeed, Comparative Examples 1, 3, 6, 7-10, 15 and 19-22 show the disadvantages when formula (1) is not satisfied. The characteristics of the PVA used in these comparative examples are shown in Tables 3, 4, 7 and 8, described in the specification at pages 37, 38, 41 and 42, respectively. Tables 9, 10, 11, 15 and 16 show results for surface condition of a green sheet and strength of a green sheet, at pages 46, 47, 48, 54 and 55, respectively, of the specification. The meaning of the data for the surface condition of the ceramic green sheet and the strength of the ceramic green sheet is found in the specification at page 44, line 12ff.

In Comparative Examples 3, 8, 10, 15, and 21, the ionic group amount was below 0.15. In Comparative Examples 6, 7, 9, 19, 20 and 22, the ionic group amount was above $218.3 \times P^{-1.046}$, as follows, wherein the first number is the actual content and the second number is $218.3 \times P^{-1.046}$: Comparative Example 6 (0.33 vs. 0.328), Comparative Example 7 (0.34 vs. 0.328), Comparative Example 9 (0.21 vs. 0.188), Comparative Example 19 (0.88 vs.

0.855), Comparative Example 20 (0.89 vs. 0.855), and Comparative Example 22 (0.34 vs. 0.328).

The data show that the surface condition of the green sheet and the strength of the green sheet were inferior for the comparative examples compared to the examples according to the invention.

Yoshida could not have predicted the above-discussed comparative results.

Claim 2, which requires that the content of the ionic group bonded to the polyvinyl alcohol via a sulfido bond (mol%) also satisfy a formula (2) that is a function of the 1,2-glycol bond content of the PVA, is separately patentable. As described in the specification herein at page 13, last line through page 14, line 4, 1,2-glycol bond content is controlled by controlling the polymerization temperature in radical polymerization of the starting vinyl ester monomer or by copolymerizing the vinyl ester monomer with any other monomer such as vinyl carbonate. But Yoshida is silent with regard to the conditions in which a polyvinyl ester, such as polyvinyl acetate, precursor of PVA, is prepared. Yoshida simply discloses that PVA is synthesized by saponification after radical polymerizing vinyl acetate in the presence of a compound having the above-discussed functional group and at least one mercapto group [0066]. In other words, it is impossible to ascertain the 1,2-glycol bond content of Yoshida's PVA. It is thus impossible to find that above-discussed formula (2) is satisfied.

For all the above reasons, it is respectfully requested that the rejections over Yoshida be withdrawn.

Applicants respectfully call the Examiner's attention to the Information Disclosure Statement (IDS) filed January 8, 2004. The Examiner is respectfully requested to initial the Form PTO 1449 submitted therewith, and include a copy thereof with the next Office communication. **Enclosed herewith** is another copy of the Form for the Examiner's convenience.

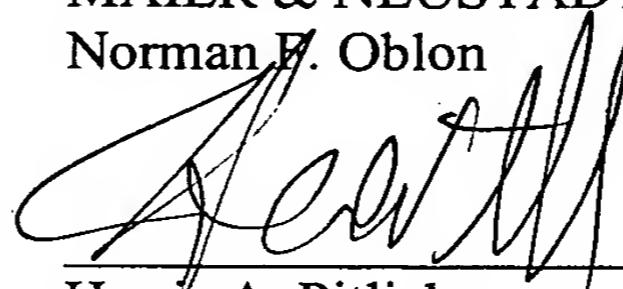
Moreover, since the date of the IDS is before the date of the Office Action and thus technically was part of the Official file as of the Office Action date, Applicants respectfully request that should the Examiner determine that a new ground of rejection needs to be made in the next Office Action relying in whole or in part on any of the references cited in the IDS, then said next Office Action not be made Final.

All of the presently active claims in this application are now believed to be in immediate condition for allowance. In addition, since the non-elected claims all contain the limitations of the elected claims, the Examiner is respectfully requested to rejoin the non-elected claims, and absent further grounds of rejection, pass this application to issue with all pending claims.

Respectfully submitted,

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